BLOOD CHANGES IN A GASTRECTOMIZED PATIENT SIMULATING THOSE IN PERNICIOUS ANEMIA.

By H. R. Hartman, M.D.,

SECTION ON MEDICINE, MAYO CLINIC, ROCHESTER, MINNESOTA.

Gastrectomy is a term often applied to an operation which is merely a resection of the major portion of the stomach. This statement coincides with Sir Berkeley Moynihan's opinion, who reviewed the history of gastrectomy in 1907 and added to the literature two cases of his own, bringing the number of reported cases to seventeen. Three doubtful cases are included in his series. Moynihan states that the first complete gastrectomy was performed by Conner in 1883. The patient died on the table. The next complete resection for carcinoma was performed by Schlatter in 1897. The patient lived fourteen months and died because of a recurrence. Moynihan's patient lived the longest after operation, three years and eight months.

My attention was first called to cases of this type by a man (Case 204441) who presented himself at the Clinic for examination on August 10, 1917. The patient was fifty-eight years of age. He had complained intermittently for the past fifteen or twenty years. His illness was characterized by exacerbations of months' duration and by a dull, heavy pain in the epigastrium immediately after meals. The pain subsided from three to four hours after meals and a sensation developed which the patient described as a hunger more distressing than the immediate after-meal pain; this was relieved by food or drink. A clinical diagnosis was made of peptic ulcer. Malignancy was suspected because of recent continued gastric distress, recent loss of fifteen pounds in weight and rapid decline in strength in the past four months.

The blood-pressure was normal. The hemoglobin was 80, erythrocytes 5,520,000 and leukocytes 8200; the index was 0.7+. No differential count was made. A single tubing of the stomach revealed 120 c.c. of gastric contents in one and one-half hours after a modified Ewald meal. No free hydrochloric acid was found; the total acidity was 4. The roentgenologist reported an indeterminate pyloric lesion. After careful dental examination four teeth were condemned because of apical abscesses and two were held under suspicion. The examination otherwise was of no special importance. The patient was operated on August 18, 1917 (W. J. Mayo). The dictated description of the operation reads as follows:

Operation. "A median incision was made which extended well up to the ensiform cartilage. A movable carcinomatous ulcer was found on the posterior wall of the stomach extending up to within almost 4 cm. of the esophagus. A total gastrectomy was performed and about 1 cm. of the esophagus removed. The end of the esophagus was sutured to the lateral wall of the jejunum, about 45 cm. from its origin, with interrupted silk and continuous catgut. The line between the esophagus and cardia was visible and was removed. Fat and glands were removed up to the diaphragm. There was very little glandular involvement." The pathological report from tissue removed was "carcinoma of the cardiac end of the stomach with no glandular involvement." Specimen showed the transition of esophageal tissue into the gastric tissue and of gastric tissue into the duodenal tissue. This is interesting from an operative point of view.

The patient returned to the Clinic on June 29, 1918. He had been comparatively well after the operation but had lost seven pounds in weight. He complained of epigastric pain, heart-burn, a heavy sensation and excessive salivation after meals. He was, however, taking three fair-sized meals each day with a glass of milk between meals. The bowel movements were loose, one to three stools each day. The scar of the operation had healed by first intention. Palpation of the abdomen revealed no pathological condition. Because of the patient's apparently favorable condition, with the exception of his weight, no laboratory tests were made.

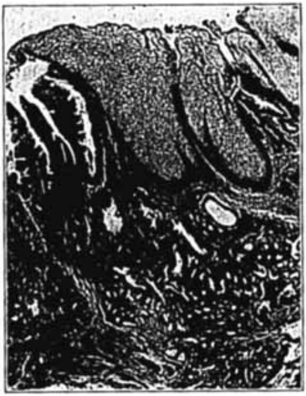

Fig. 1.—Case 204441. Photomicrograph, showing transition of the esophageal mucosa into the gastric mucosa.

May 5, 1919, the patient again visited the Clinic. He had grown progressively weaker during the last year, more rapidly the last three months. His diet was general and fairly well balanced. He complained of regurgitation after meals which, if long continued, resulted in the regurgitation of bile; this was fairly well controlled by salt-water, a prescription of his own. He was somewhat paler than on the previous examination, and his wife stated that he was "more yellow" at times. He weighed 100 pounds. There were no paresthesias or lightning pains; the mouth had not been sore; the mucous membrane of the tongue was somewhat smooth at the edges. The most interesting feature was disclosed by the laboratory study of the case, particularly of the blood. The urine showed a faint trace of sugar, even on a starch-free diet; it contained a faint trace of albumin, a few hyaline casts and pus cells and was slightly acid in reaction; the specific gravity ranged between 1012 and 1018.

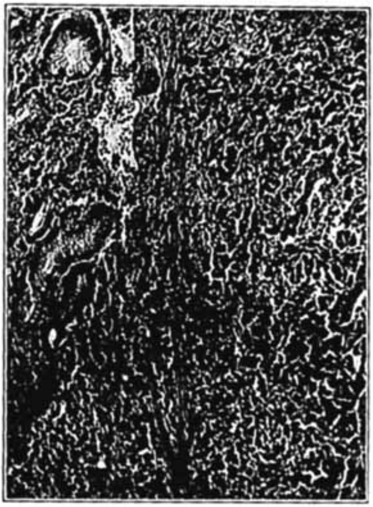

FIG. 2.—Case 204441. Gastric carcinoma at the base of the ulcerated area.

The blood sugar by the Benedict method was 0.05 per cent. The patient declined further study of the nature of the glycosuria. The cytologic study of the blood revealed the picture of pernicious anemia. The hemoglobin ranged between 53 and 55; the erythrocytes were between 2,000,000 and 2,280,000; the white cells varied between 2200 and 7600, and the color index was constant at 1.2+. The differential count read as follows: 200 cells counted; polymorphonuclear neutrophils, 59 per cent.; small lymphocytes, 35.5 per cent., large lymphocytes, 5.5 per cent. Slight anisocytosis and poikilocytosis were present. The Ribiere test revealed an increased resistance of the red cells. The blood Wassermann test was negative.

The blood was classed in Group IV. An analysis of the duodenal content estimated in Wilbur and Addis units showed an increase in bilirubin, urobilin and urobilinogen. A neurological examination did not reveal cord changes or other abnormalities. The pancreatic ferment test showed marked reduction of pancreatic activity. Roentgenograms of the chest and the esophageal-jejunal juncture were negative. In consultation it was decided that although the blood count was that of pernicious anemia several clinical features of pernicious anemia were lacking.

While it is realized that the study of one case is of no value in drawing conclusions, it may nevertheless give a possible clue to the cause of pernicious anemia. The case under discussion suggests that the absolute lack of gastric ferments might have something to do with an incomplete or abnormal food-splitting process, the results of which might themselves be hemolytic to the blood or detrimental to the blood-forming organs. Pernicious anemia is invariably associated with achylia. This patient was, of course, completely deprived of gastric juice by the operation, and in the course of time returned to the Clinic with a blood picture of pernicious anemia. Immediately the question arises—Why do not all patients with achylia develop pernicious anemia? a question which cannot at present be answered.

With this theory of the cause of pernicious anemia in mind a thorough review of the French, Italian, German and English literature was undertaken. Much has been written on the operative technic and the immediate postoperative results of complete gastrectomy but with one exception, Moynihan's second case, no report was found in which a patient's subsequent history had been followed for any length of time. Moynihan's patient was a man, aged forty-three years, who had a two-year history of delayed gastric distress one hour after the ingestion of food. The pain was relieved for about one hour by food and by vomiting, which was obstructive at the time of examination. The patient also complained of a dysphagia. May 31, 1907, a complete gastrectomy was performed for carcinoma of the stomach, situated high on the lesser curvature. The esophagus was sutured to the first jejunal loop by interrupted and continued sutures. The patient's immediate postoperative convalescence was rapid and satisfactory and he left the hospital in eighteen days. Moynihan again discussed this case in 1911, stating that the patient had been in normal health until 1910, when "he began to show evidences of profound anemia and was strikingly pale and breathless, and he lost weight." He improved under treatment so that he was able to return to the work he had done formerly. In August, 1910, he again failed in strength, although his appetite was good and he had no indigestion. In October the anemia reappeared and he was obliged to stop work. In the latter part of December the patient was confined to bed; he died January

31, 1911, having survived the operation three years and eight months. The following is the summary from the necropsy report by Goffery Steward: "All the organs exhibited an extreme anemia; the blood in the heart and great vessels was watery. The liver was pale and somewhat fatty. The spleen contained a large and very old infarct. The heart muscle was pale and flabby. No recurrence of the carcinoma was found. The chief points of interest were, (1) the complete absence of any recurrence or dissemination of the malignancy; (2) the profound anemia, and (3) the absence of any striking jejunal dilatation at or near the site of anastomosis."

In Moynihan's case, as in the one herewith reported, there were recurring anemia and weakness, with some of the pathological changes seen in pernicious anemia. Apparently pernicious anemia was not thought of in this case; otherwise a more complete necropsy report would have been made, together with reference to the pathology of the bone-marrow. However the history is suggestive of pernicious anemia and adds its bit to the evidence at hand.

June 1, 1920, our patient returned to the Clinic in a somewhat weaker condition. The recrudescences and remissions of his anemia were of shorter duration than are usually observed in pernicious anemia, while his health in general was in a steady decline.

The patient had had six severe attacks of abdominal pain lasting from one-half hour to five hours; they were sudden in onset, were associated with the vomiting of large quantities of bile and were terminated by the results of a purge. They were not accompanied with jaundice. Urinary symptoms were absent with the exception of slight frequency. The diet was liberal; the patient ate fish, liver, pork, cabbage, eggs, milk, potatoes, squash, carrots, lettuce, radishes, sauces, jellies, candies, fruits, peanuts, toast, waffles and so forth. Practically the only foods which distressed him were meat, which he craved, and fresh bread. These seemed to precipitate regurgitation. The general course of the anemia seemed to be a steady decline with short recrudescences and remissions rather than of marked remissions. The examination of the eyes, including the fundi, was negative. There was no glossitis and the atrophy at the edge of the tongue had not spread. The abdomen was pasty but nothing abnormal was palpable. There was moderate edema of the legs as far as the knees. The systolic blood-pressure was 120 and the diastolic was 80. The pulse-rate was 78. The specific gravity of the urine was 1016; it was slightly alkaline and, aside from a trace of albumin, was negative. The hemoglobin remained quite constantly at 48 per cent. and the erythrocytes varied between 1,420,000 and 1,880,000, the leukocytes between 4000 and 4700 and the color index between 1.2+ and 1.6+. The differential count showed polymorphonuclear neutrophils 64 per cent., small lymphocytes 33 per cent. and large lymphocytes 3 per cent. Anisocytosis was moderate, poikilocytosis and polychromatophilia were slight. The platelet count was 126,000. The blood Wassermann test was again negative. The coagulation time (Lee method) and calcium time were eight minutes. There was an increased resistance of the red cells. A roentgen ray of the chest and of the esophageal-jejunal juncture was negative. The pancreatic test of the stool was less than 250 units (Wohlgemuth test). Schmidt's test of the stool for bile was positive. The stool was thick and white, containing undigested meat fibers, mucus and fat, but no parasites. The blood picture was again considered suggestive of pernicious anemia, but with several unusual features.

It is emphasized that no attempt has been made to drawn conclusions from these two cases; they do, however, open a field for investigation. Dr. Mann, of the Mayo Foundation now has begun as experimental study of the blood changes following gastrectomy.

BIBLIOGRAPHY.

1. Conner: Quoted by Moynihan.
2. Moynihan, B. G. A.: On total extirpation of the stomach; with a record of an unsuccessful case. Brit. Med. Jour., 1903, ii, 1458–1459.
3. Moynihan, B. G. A.: A case of complete gastrectomy. Proc. Roy. Soc. Med., 1907–1908, i, Surg. Sect., 81–92.
4. Moynihan, B. G. A.: A case of complete gastrectomy. Lancet, 1911, ii, 430–431.
5. Schlatter, C.: Quoted by Moynihan.

STREPTOCOCCUS HEMOLYTICUS EMPYEMA.[1]

By James I. Johnston, M.D.,
PHYSICIAN TO MERCY HOSPITAL; ASSISTANT PROFESSOR OF MEDICINE, UNIVERSITY OF PITTSBURGH.

(From the Medical Department of Mercy Hospital, Clinical Service, University of Pittsburgh.)

Since February of this present year we have been much impressed by the frequency of pleural effusions. During the pandemic of influenza of 1918 this feature in our experience was very infrequent, but common in this outbreak. Among our cases there were over 25 which could be classified as empyemata; 7 of these were due to the streptococcus hemolyticus. These 7 patients developed this feature as a complication and not a sequel of acute pulmonary infection; they were treated by frequent aspirations, which was followed by subsequent resection; the number of aspirations aver-

---

[1] The material upon which this article is based was presented at the monthly conference of the staff of the Mercy Hospital. The article itself was prepared for the Pennsylvania Section, Clinical Congress of the American College of Surgeons, at Pittsburgh, October 7, 8, 9, 1920.